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Rubber Research Institute of Ceylon

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DARTONFIELD ESTATE — VISITOR'S DAY

The services of technical officers are available to visitors on the second Wednesday in each month ; the estate superintendent is available every Wednesday. Visitors are requested to arrive on the estate not later than 9–30 a.m.

Visitors will be welcomed at the station on other days provided an appointment has been made in advance.

Dartonfield Estate is situated about 3½ miles from the main Matugama–Agalawatta Road, the turn-off being near culvert No. 14/10. The distance from Colombo is approximately 47 miles.

PUBLICATIONS

Rubber Research Institute publications comprising Annual Reports, Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors (resident in Ceylon), Superintendents and Local Agents of rubber estates in Ceylon over 10 acres in extent. Forms of applications can be supplied to the Superintendents of large estates for the use of their assistants.

It will be appreciated if subscribers will return any back publications which are of no use to them.

ADVISORY CIRCULARS

The undernoted Circulars may be obtained on application at 25 cents per copy. Future issues in the series will be sent free of charge to estates registered for the receipt of our publications :—

(1) Notes on Budgrafting Procedure (Revised May, 1952)
(5) Straining box for latex (January, 1940).
(6) Notes on the care of Budded Trees of Clone Tjirandji 1 with special reference to Wind Damage (Sept. 1938).
(12) Warm Air Drying House for Crepe Rubber (Reprinted 1952).
(14) Rat Control (Sept. 1940).
(17) Tapping Young Budded Trees – Prevention of Precoagulation (2nd Supplement) (Revised March, 1949).
(19) Density of Planting and Thinning out (December, 1942).
(21) The Control of Bark Rot and Canker (Revised February, 1952).
(23) Uniformity in the Nomenclature of Clones & Clonal Seedlings (December, 1944).
(28) Oidium Leaf Disease (November, 1950) (superseding Circular No. 22)
(30) Fertilisers for Rubber (Aug. 1951) (superseding Circulars No. 2, 18 & 29).
(31) Root Disease in Replanted Areas (October, 1951) (superseding Circular No. 10).
(32) Crown budding for Oidium Resistance (October, 1951).
(33) Mechanical Felling of Rubber Trees (February 1952).
(34) Tapping Systems (February, 1952) (superseding Circular No. 17).
(35) Notes on Rubber Seedling Nurseries (February, 1952) (superseding Circular No. 3).

DETERMINATION OF THE DRY RUBBER CONTENT OF NATURAL RUBBER LATEX. PART I. METHODS FOR AMMONIATED LATEX

BY

E. J. Risdon, Chemist and the Staff of the Chemical Dept.*

Introduction.

VARIOUS methods for the determination of the d.r.c. of freshly preserved latex are available in the Literature (2, 3, 5). The matter is of considerable importance to Estates selling partially preserved latex to factories engaged in the concentration of latex as the method of payment is based on the total rubber content of the latex as determined by the buyer on the ammoniated latex. The Institute is also concerned (1) in this, as one buyer's contract requires the Institute to specify the procedure to be followed and to act as arbitrators in cases of dispute about analytical results. Sometime ago agreement to use the British Standards Institution's method (3) was reached but it is not clear from the specification which concentration of acid should be employed, the appropriate paragraph reading as follows :—

> " It is permissible to coagulate the amount of latex specified above with up to 150 ml. of 0.5 per cent. acetic acid (v/v) instead of up to 80 ml. of 2.0 per cent acetic acid (v/v)."

The latex buyer preferred to use .5% acid on the grounds that he understood this to be the preferred method in Malaya. Tests have been made with Dartonfield latex to ascertain whether a significant difference between the results by the two methods can be detected.

Methods of Investigation and Discussion of Results : In the first experiment (A) six samples of Dartonfield bulked latex are ammoniated to 0.5% and allowed to stand for approximately 18 hours before testing in duplicate for d.r.c. by three methods involving the use of 5%, 2% and 0.5% acetic acid respectively. The results are summarised in Table I with the analysis of variance in Table II. These tables show that the variance due to between methods of test does not appear to be significant in comparison with that due to the interaction 'samples $\times$ methods.' None of the first order interactions appear significant in comparison with the second order interaction. It is therefore tentatively concluded that this experiment does not clearly differentiate significantly ($P \leq .01$) between the three methods of test and that this result may not be due to a differential response to the methods by the samples.

TABLE No. I.

Test Procedure	No. of Latex Samples	No. of Tests per Sample	d.r.c.	
			Total	Mean
5% Acetic Acid	6	2	374.80	31.233
2% Acetic Acid	6	2	374.26	31.188
0.5% Acetic Acid	6	2	373.08	31.090

* D. S. Muthukuda, M. T. Veerabangsa.

TABLE No. II

Source of Variance	Deg. of Freedom	Var-iance	F(S × M)	F(S×M×D)
Between Samples (S)	5	15.8186	—	—
Between Methods (M)	2	.06448	1.643	—
Between Duplicates (D)	1	.34418	—	—
S × M	10	.039257	—	1.54
S × D	5	.01761	—	0.691
M× D	2	.00964	—	0.378
S × M × D	10	.025499	—	—

In a second experiment (B) eight samples (six of bulked budded, and two of bulked old seedling latex) of Dartonfield latex selected on different days are tested in triplicate, after 20 hours and again after 4 days storage as 0.5% ammoniated latex, by the 2% and 0.5% acetic acid methods. Table III gives a summary of the experimental data and Table IV a partial analysis of variance. The variance due to between methods of test appears to exceed significantly (at P = .05, but not at P = .01) that due to the interaction ' samples × methods ', which appears slightly larger at P = .01 than that due to ' remainders '. This is at present interpreted to mean that the differences between the methods are significant, but only at P = .05, —the 0.5% acid method giving the higher mean values — and that there may be a differential response by the samples to the methods used. The latter might account for the apparent divergence between the two experiments (A and B), but it should be pointed out that (*a*) in the second experiment the level of significance of the difference between methods is only 5% not 1% and that (*b*) inexperience of the operator in the first experiment may be a contributory cause. The variance due to the interaction ' methods of test × times of storage ' does not appear to exceed significantly that due to ' remainders '. This is at present interpreted to mean that it is not likely to be necessary to use one concentration of acid at one time, and the other at, say, the longer time of storage.

TABLE No. III

Latex		Mean d.r.c. values			
Type	No. of Samples	20 Hrs. Storage		4 days Storage	
		.5% Acid	2% Acid	.5% Acid	2% Acid
Budded	6	30.565	30.549	30.598	30.538
Seedling	2	28.880	28.822	28.823	28.785
Both	8	30.144	30.117	30.155	30.100

TABLE No. IV

Source of Variance	Deg. of Freedom	Variance	F(S × M)	F(Remainders)
Between Samples (S)	7	63.5342	—	—
Between Methods (M)	1	.03961	7.073*	—
Between Times of Storage (T)	1	.00024	—	—
Between Replicates (R)	2	.0358	—	—
S × M	7	.0056	—	4.198**
S × T	7	.02083	—	15.615**
S × R	14	.00162	—	1.214
M× T	1	.00469	—	3.516
M× R	2	.0002	—	0.150
T × R	2	.00014	—	0.105
Remainders	51	.001334	—	—

In the third experiment (C) an attempt has been made to use the method (4) employed in Estates' factories to coagulate fresh latex (that is about 1 ounce of strong acetic acid, added as a 1% solution, per 10 to 11 lbs. of dry rubber in latex) for the determination of the d.r.c. of freshly ammoniated latex. Five samples of Dartonfield bulked latex selected on different days have been ammoniated to 0.5% and analysed in triplicate for d.r.c. using the 'factory method' and the B.S.I. 2% acetic acid method. The experimental data is summarised in Table V and the analysis of variance is given in Table VI. The variance due to between methods appears to be significant in comparison with that due to 'samples × methods' at P = .01 and it is concluded that with these samples the factory method may give a significantly higher mean d.r.c. than the B.S.I. method. Although this method may have been used in a modified form on Estates, the value of the method is doubtful because (*a*) coagulation is not readily obtained and heating or prolonged standing is necessary, (*b*) the average difference found between the highest and the lowest of the triplicate results with these samples of ammoniated latex is rather more than twice that found between the highest and lowest with the B.S.I. procedure employed and, (*c*) the second paper in this series gives evidence which suggests that under the conditions employed the d.r.c. of fresh latex is not necessarily significantly different from the value found for the corresponding freshly preserved latex using the B.S.I. method. This implies that the B.S.I. method may be preferred if near agreement between the Estate's 'fresh latex' d.r.c. and the buyer's ammoniated latex d.r.c. is expected.

TABLE No. V

	Mean d.r.c. (5 Samples of Latex tested in Triplicate)	
	2% Acetic Acid (BSI)	'Factory Method'
Highest Values	29.468	29.898
Lowest Values	29.294	29.528
Average of all readings	29.385	29.727

TABLE No. VI

Source of Variance	Deg. of Freedom	Variance	F(S × M)	F(S × M × R)
Between Samples (S)	4	191.2989	—	—
Between Methods (M)	1	.88065	55.21**	—
Between Replicates (R)	2	.18739	—	—
S × M	4	.01595	—	1.643
S × R	8	.00665	—	<1.0
M × R	2	.02486	—	2.560
S × M × R	8	.00971	—	—

Practical Applications and Summary : The alternative strengths, 2% and 0.5%, of acetic acid available for the determination of the d.r.c. of freshly ammoniated latex by the B.S.I. method are considered and it is concluded that for the samples tested the 0.5% method, preferred by one buyer of ammoniated latex, does not give a significantly lower value. However there is evidence in one of the experiments of a significant 'samples × methods (*i.e.*, strengths of acids)' interaction, suggesting that different latex samples can respond differently to the two methods of test. The interaction 'methods × times of storage (*i.e.*, 20 hrs. or 4 days after ammoniation)' does not appear to be significant, suggesting inter alia that different methods of test need not be applied for these two times of storage. The use of the 'factory method' as employed for fresh latex coagulation, *i.e.*, 1 ounce of acetic acid, added as a 1% solution per 10 to 11 lbs. d.r.c. of the latex, has certain objections when applied for the determination of the d.r.c. of freshly ammoniated latex.

Experimental : Details of the d.r.c. procedure are given in the experimental section of the next paper of this series. The d.r.c. in the tables is the weight of dry rubber per 100 parts of original latex and the total d.r.c. figures are the sums of the appropriate figures contributing to the total. The figures given under the F columns are the ratio of the variances thus in Table II line 2 the value 1.643 in the column headed F(S × M) is the variance due to between methods divided by that due to the interaction 'samples × methods' (S × M). A small * near a figure in a column headed F implies apparent significance at P = .05 and two * implies the same thing at P = .01

Literature

(1) Ann. Rept. R.R.I. of Ceylon 1951 Chem. Dept. Rept.
(2) Bishop R.O. Malayan Agric. J. 1927 15 No. 1 pp. 1.
(3) B.S. 1672 Part I : 1950 : pp. 8–9.
(4) Preparation of Plantation Rubber in Ceylon 1943 Ed. by T. E. H. O'Brien.
(5) R.R.I. of Malaya Planting Manual No. 4 1932. Section H. pp. 1.

THE DETERMINATION OF THE DRY RUBBER CONTENT OF NATURAL RUBBER LATEX. PART II—THE EFFECT OF AMMONIATION AND STORAGE ON THE DRY RUBBER CONTENT OF FIELD LATEX

BY

E. J. RISDON, Chemist, and the Staff of the Chemical Dept.*

Introduction.

NATURAL rubber latex is sold in Ceylon by Estates and Small-Holders on the basis of its estimated total dry rubber content (total d.r.c.). The method employed to obtain this estimate may be expected to depend inter alia upon the use to which the buyer will put the latex. Thus, latex intended for concentration by creaming or by centrifuging is naturally sold after (partial) preservation by the producer. The d.r.c. of this preserved latex may be determined by the method of the British Standards Institution (3) which carries a modification for freshly preserved latex (4). No evidence is at our disposal to show that any Estates in Ceylon, other than Dartonfield or that any Agency House managing Estates selling preserved latex have obtained the apparatus necessary to carry out the d.r.c. tests by the methods of the B.S.I. (3,4).

The Institute has therefore investigated the problem of how far the d.r.c. determined by ' Estate's methods ' on the fresh latex reflects the d.r.c. of the same bulk of latex when the determination is made shortly after ammoniation. A preliminary reference to this work is already available. The technical literature (2 et al), principally Malayan, observed by the writer suggests that immediately following ammoniation there may be a drop in the d.r.c. but this is followed by a rise to a peak value (within one to two days) prior to a gradual fall.

The number of replications in some of this data is not large and it is by no means certain to us that generalisations based on Malayan figures would necessarily apply to Ceylon where the proportion and distribution of the components of the non-rubber solids of the latex may be different due to soil differences and perhaps to clonal differences.

Methods of Investigation and Discussion of Results : In the first experiment (A) five samples, three from Dartonfield and two from an outside estate, have been selected on different days and samples weighed out for d.r.c. determination in triplicate before ammoniation, within forty minutes after ammoniation and on the third, tenth, seventeenth and on the twenty-fourth days after ammoniation. The latex has been ammoniated to 0.5% using a concentrated solution of ammonia and for comparison the fresh latex has been diluted with an equal proportion of water. This procedure has been used as means of delivering small quantities of gaseous ammonia with sufficient control are not at present available at Dartonfield. The d.r.c. of the ammoniated latex has been determined using the British Standards Institution's procedure (4) with 2% acetic acid coagulant and mechanical sheeting.

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The d.r.c. of the fresh latex has been determined by an analogous method involving the use of 1 fluid ounce of acetic acid (added as a 1% solution) for 10 to 11 lbs. of dry rubber. Further details of the procedure and the results are shown in the section entitled Experimental.

Considering the means of the five samples as shown in Tables I and II, there is a slight rise in d.r.c. soon after ammoniation followed by a fall after the three days reading but the differences observed are not statistically significant. In fact the analysis of variance shows that of the principal effects (variations between samples, between times of test and between replicates) only that between samples is significant at $P \leq .05$ in comparison with the first or second order interactions. Not one of the first order interactions is significant in comparison with the second order interaction. It is concluded therefore that the actual d.r.c. differences observed in the experiment between different times of test are not significant, this might be due to wide differences between the samples in their response to times of testing but it is not, in this case, supported by the value of the interaction ' samples × times '.

TABLE No. I

Time of Testing in Triplicate	Dartonfield Bulk (3 Days Sampling) d.r.c.		Estate E, Budded Latex (2 Days Sampling) d.r.c.		Both Estates (5 Days Sampling) d.r.c.	
	Totals	Means	Totals	Means	Totals	Means
Before Ammoniation	263.28	29.253	185.85	30.975	449.13	29.942
40 Mins. After Ammoniation	265.22	29.469	186.45	31.075	451.67	30.111
3rd Day	266.83	29.648	187.62	31.270	454.45	30.297
10th Day	265.64	29.516	186.50	31.083	452.14	30.143
17th Day	264.70	29.411	186.53	31.088	451.23	30.083
24th Day	264.83	29.426	186.38	31.063	451.21	30.081
Total	1590.59	(29.454)	1119.33	(31.093)	2709.83	(30.109)

TABLE No. II

Source of Variance	Deg. of Freedom	Variance	F (S×T)	F (R×T)	F (S×T×R)
Between Latex Samples (S)	4	74.480	330.7**	400.2	389.7
Between Times of Test (T)	5	0.1973	.8761	1.060	1.032
Between Replicates (R)	2	0.5197	2.308	2.793	2.719
S × T	20	0.2252	——	——	1.178
S × R	8	0.1810	——	——	0.9471
T × R	10	0.1861	——	——	.9738
S × T × R	40	0.1911	——	——	——
TOTAL	89	(Total sums of Squares 315.4018			

In the second experiment (B) a total of six samples (three of white slaughter-tapped old seedling latex and three of yellow budded latex) of bulks of Dartonfield latex have been selected on separate days and sub-samples ammoniated to 0.0%, 0.5% and 0.7% ammonia using a 20–25% ammonia solution. The d.r.c. has been determined in triplicate on the fresh latex and again at 1 hour, 24 hours and 72 hours after ammoniation on the ammoniated portions. The latter values have been corrected to allow for the fact that fluid *i.e.*, ammonia solution has been added to the ammoniated but not to the fresh samples. In this and subsequent experiments the d.r.c. of the ammoniated latex has been determined using 0.5% acetic acid. The experimental results are summarised in Table III.

TABLE No. III

Time of Testing in Triplicate	%Ammonia	Bulked yellow Latex (3 Samples) Total d.r.c.	Bulked white Latex (3 Samples) Total d.r.c.	All Samples d.r.c. Total Mean.
Before Ammoniation	0.0	280.77	255.11	535.88 29.771
1 Hr. after Ammoniation	0.5	279.87	254.84	534.71 29.706
24 Hrs. after Ammoniation	0.5	280.38	255.55	535.93 29.774
72 Hrs. after Ammoniation	0.5	280.03	255.30	535.33 29.741
1 Hour after Ammoniation	0.7	280.30	255.70	536.00 29.778
24 Hrs. after Ammoniation	0.7	279.82	256.15	535.97 29.776
72 Hrs. after Ammoniation	0.7	279.85	256.26	536.11 29.784
6 Totals		1961.02	1788.91	3749.93

The analysis of variance given in Table IV shows that the variance due to ' between treatments ' does not appear to be significantly higher than that due to the interaction ' samples × treatments ', suggesting that the differences observed in the last column of Table III may be fortuitous. Further the interaction ' samples × treatments ' appears in this experiment significantly higher than the second order interaction ' samples × treatments × replicates', which is at present interpreted to mean that different samples of latex may respond differently to the treatments. Further information can be obtained from experiment B if the data referring to the unammoniated latex is omitted, when the experiment can be regarded as six samples × six treatments × three tests and can be summarised in the form shown in Table V. Part of the analysis of variance is shown in Table VI, where only the variances due to the

principal effects and to the first order interactions have been separated ; the second and third order interactions being lumped together as ' remainders ' for this purpose. The variance due to ' between times of test ', *i.e.*, 1 hour, 24 hours and 72 hours after ammoniation, still appears to be not significantly greater than that due to the interaction ' times × samples ' which appears slightly larger (at P = .01) than that due to ' remainders '. This is at present interpreted to mean that the differences between the average d.r.c. at the different times of test, as shown in Table V, may not be significant and that this might be due to the fact that different samples appear to respond differently at the various times of test.

TABLE No. IV

Source of Variance	Deg. of Freedom	Variance	F(S×T)	F(T×R)	F(S×R)	F(S×T×R)
Between Samples (S)	5	343.7771	>343.7**	>343.7	>343.7**	>343.7
Between Treatments (T)	6	.0142	.8749	9.311	21.85	19.51
Between Replicates (R)	2	.0591	3.641	38.75	90.92**	81.18
S × T	30	.01623	——	——	——	22.29**
S × R	10	.00065	——	——	——	.8929
T × R	12	.001525	——	——	——	20.95**
S × T × R	60	.000728	——	——	——	——
TOTAL	125					

TABLE No. V

% Ammonia	Type of Latex	Times of Testing after ammoniation (d.r.c. values)					
		1 Hour		24 Hours		72 Hours	
		Total	Mean	Total	Mean	Total	Mean
0.5	White.3 Samples	254.84	28.316	255.55	28.394	255.30	28.367
0.5	Yellow.3 Samples	279.87	31.097	280.38	31.153	280.03	31.114
0.5	Total	534.71	29.706	535.93	29.774	535.33	29.741
0.7	White.3 Samples	255.70	28.411	256.15	28.461	256.26	28.473
0.7	Yellow.3 Samples	280.30	31.144	279.82	31.091	279.85	31.094
0.7	Total	536.00	29.778	535.97	29.776	536.11	29.784
0.5 + 0.7	Grand Total	1070.71		1071.90		1071.44	

TABLE No. VI

Source of Variance	Deg. of Freedom	Variance	F (Remainders)
Between Samples (S)	5	293.18446	
Between% Ammonia(N)	1	0.0414	
Between Times (T)	2	0.0100	
Between Replicates (R)	2	0.04585	
N × T	2	.01090	10.009**
S × T	10	.00578	5.308**
S × N	5	.02572	23.618**
R × T	4	.00275	2.525
R × N	2	.00230	2.112
R × S	10	.0006	——
Remainders	64	.001089	——

Comparisons of the variance due to ' between ammonia contents ' with that due to the interaction ' ammonia contents × samples ', which is numerically the largest of the first order interactions, and of this to the variance due to remainders might suggest that samples of latex may react differently in respect of their d.r.c. to the two levels of ammoniation. Similarly conclusions may be tentatively drawn in respect of the ' ammonia contents × time ' interaction whose variance appears to be significantly higher than that due to ' remainders '. But these interpretations must be regarded only as pointers as the number of degrees of freedom involved in the appropriate comparisons is seldom large.

In a third experiment (C) a total of eight samples (six of slaughter tapped old seedling and two of budded latex) of bulks of fresh Dartonfield latex have been selected on separate days and subsamples ammoniated to 0.0% and 0.5%. The d.r.c. has been determined in triplicate on the fresh latex and again at 20 hours and 4 days after ammoniation. In the latter two cases the determination has been carried out using the B.S.I. method (4) with 0.5% and with 2% acetic acid, such that a total of 6 readings is available at each test. For the purposes of this paper the readings have been taken in pairs by averaging the highest values obtained by each method for ' replicate (*a*) ' and the lowest for ' replicate (*c*) ' etc. The experiment thus reduces to the form of Eight samples × Three times of testing × Three tests and a summary of the data is shown in Table VII where the values for the unammoniated latex are ' corrected ' to the value which would be expected on the assumption that the latex is diluted by fluid to an extent equivalent to that employed on ammoniation to 0.5% with concentrated ammonia solution.

TABLE No. VII

Type of Latex	No. of Samples	Times of Testing with respect to Ammoniation					
		Fresh Latex		20 Hrs. (after)		4 Days (after) Ammoniation	
		Total d.r.c.	Mean d.r.c.	Total d.r.c.	Mean d.r.c.	Total d.r.c.	Mean d.r.c.
Bulked Budded	6	549.877	30.549	550.025	30.557	550.230	30.568
Bulked Seedling	2	173.732	28.955	173.105	28.851	172.825	28.804
Total	8	723.609	30.150	723.130	30.130	723.055	30.127

The analysis of variance is shown in Table VIII where it will be observed that the variance due to 'between times of test' is less than that due to the interaction ' samples × times of test ' which appears to be significantly higher than the variance due to the second order interaction. Thus in all three experiments the tentative conclusion drawn from the results is that, within the limits and samples employed, the differences between the treatments (times of test) are not significant in comparison with the ' samples × treatments ' interaction, which in two cases appears significant in comparison with the second order interaction (or remainders of Table VI), suggesting that failure to observe differences between the treatments may be due inter alia to a differential response of the samples to the treatments involved.

TABLE No. VIII

Source of Variance	Deg. of Freedom	Variance	F (S×T)	F (S×R)	F (S×T×R)
Between Samples (S)	7	46.8753	>46.9**	>46.9	—
Between Times (T)	2	.003764	<1.00	—	—
Between Replicates (R)	2	.02892	—	33.37**	—
S × T	14	.02502	—	—	47.12**
S × R	14	.000867	—	—	1.633
T × R	4	.000191	—	—	<1.00
S × T × R	28	.000531	—	—	—

A straight comparison of the means of the d.r.c. of the unammoniated latex with that of the d.r.c. of the latex 20–24 hours after ammoniation to .5% ammonia appears to show no significant difference after correction for the dilution by water added with the ammonia (Standard Error = .038, 14 readings).

Practical Applications : It must be clearly understood that any generalisations made on the basis of the data are only generalisations and further that the tentative conclusions of the previous section are in many cases only pointers as the number of degrees of freedom involved are not always large, and must, of course, only apply to the conditions employed and samples tested. On this understanding the following comments are offered for guidance only :—

(1) No evidence to show that the d.r.c. of fresh latex rapidly and significantly decreases in the 3–5 day period following ammoniation to 0.5% by ammonia solution has been obtained, provided correction is made for the weight of water added. This implies that provided there is no undue delay estates would not, in general, be expected to lose financially by selling latex on the basis of its total rubber content *i.e.*, weight × % d.r.c. as received by the buyer instead of on the basis of its fresh total rubber content as ' tapped '. Minor discrepancies or losses due to imperfections of the analytical procedures employed must be expected from time to time, but major discrepancies may well be comparatively rare especially if the latex is not homogeneous in origin. Discrepancies can occur as there is evidence of a differential response by the latex to the treatments (times of test), but from an examination of the methods employed at some estates to determine the d.r.c. of fresh latex a much more likely cause is the imperfection of the methods used.

(2) No evidence of a large and significant difference between the d.r.c. of fresh latex compared to the d.r.c. 20–24 hours after ammoniation has been observed experimentally, provided there is no delay in ammoniation to .5% and correction is applied for the added water. This implies that if an estate or agency should decide to check fresh d.r.c. values at a central place a delay (due to transport etc.) of 24 hours before analysis need not necessarily be a handicap.

Experimental : In experiment A the field latex is brought to the factory ' weighed up ', strained into a suitable tank, mixed with a paddle and sampled by taking approximately one winchester quart which is removed to the laboratory where it is mixed by shaking, restrained and where about 350 grams are sub-sampled into a conical flask and ammoniated with swirling by the addition of the calculated weight of 20–25 % ammonia solution. (At the same time a second sub-sample is taken to obtain the d.r.c. of the fresh latex). The ammoniated latex is carefully corked and stored out of the sun in a cupboard. Before re-sampling the flask is swirled and examined for signs of coagulation ; coagulated or partially coagulated samples are rejected and a new sample of fresh latex is obtained.

The d.r.c. of ammoniated latex is determined as follows : After swirling the flask, pipette into a weighed glass stoppered conical flask or weighing bottle three lots of about 12 ml. of the latex swirl the flask and accurately weigh out by difference into beakers three portions of approximately 10 gms. as the samples for triplicate determinations. To each separate portion 20 ml. of distilled water is added and the whole mixed. Over a period of about 5 minutes with constant stirring up to 80 ml. of 2% (V/V) acetic acid is added. The beaker is covered with a clock glass and placed over a steam bath to obtain a clear coagulum for (not more than) 15 minutes. The beaker is then allowed to stand overnight at room temperature. Next morning the coagulum is collected into one piece with the aid of a glass rod used to press the pieces together. In some cases filtration through muslin or paper is desirable. The coagulum is washed and sheeted to less than 2 mm. thickness using a pair of grooved and a pair of smooth rollers with water full on for the grooved mill and just as for the smooth mill. Since pieces of coagulum may readily be lost during milling it is customary to have an extra person to watch while one is milling. The sheet is dried at 70°C.

The method employed for the fresh unammoniated latex is similar except that only a few ml. of 1% acetic acid, equivalent in quantity to 1 fluid ounce of strong acid per 10–11 lbs. dry rubber, are added. The appropriate amount being calculated from the metrolac estimate of d.r.c.. For the purposes of the tables the d.r.c. is the weight of dry rubber as above as a % of the weight of the latex and the total d.r.c. values in the tables are the sums of the appropriate % figures contributing to the total. Since the determinations are always in triplicate the convention has been adopted that the readings shall always be arranged so that replicate (*a*) is the highest value and (*c*) the lowest value. Thus differences between replicates are differences between numerical values rather than differences between order of sub-sampling or testing etc. The detailed experimental results have not been presented but the tables present a summary of the totals for ' treatments '. The figures given under the columns headed F values are ratios of the variances, thus in Table II line 1 the value of 330.7 for F (S × T) is the variance between samples divided by that due to the interaction ' samples (S) × treatments (T).'

In experiments (B) and (C) the detailed procedure followed is substantially that described for experiment (A) except that rather more than 350 gms have been taken as the sub-sample. Any other differences *e.g.*, concentration of acid, method of correction for the dilution effect of ammonia solution etc. have been briefly noted in the text in previous sections. When using 0.5% acetic acid up to 150 ml. is added. The correction applied for dilution by the ammonia solution is necessarily somewhat arbitrary but is comparatively easily made on the basis of actual or calculated (from density tables) weights of the fluid involved.

Acknowledgment is made to the technical officers of the London Advisory Committee for reading and commenting upon the manuscript.

Literature

(1) Ann. Rept. R.R.I. of Ceylon (Chemical Dept. Rept.) for 1951.
(2) Bishop R. O. Malayan Agric. J. 1927 15 No. 1 pp. 1.
(3) B. S. 1672 : Part 1 : 1950 : pp. 8–9.
(4) B. S. 1672 : Part 1 : 1950 : pp. 8–9 with section 1–33.

CLONAL YIELD MAPS FOR RUBBER IN CEYLON

BY

D. H. Constable & C. A. de Silva *

FOLLOWING on the publication[1] of the clonal yields from commercial estates by one of the authors * it was felt that a more convenient picture might be presented to planters by the preparation of maps (*see* plates 1–9) showing for each clone of interest its yield class for full size plantings in various areas with the proviso that the acreages for each clone in each area are not comparable.

The yield classes chosen are : over 1000 lbs/acre, 800–1000 lbs/acre, 600–800 lbs/acre and under 600 lbs. per acre. Using these classes the yields from estates have been filled in on the estates position traced from the " Diagram of the Planting Districts of Ceylon ".

From this then the planter contemplating the use of a particular clone can see at a glance how well it has done in his area. In this connection it should be noted that experiments in Indonesia quoted by Dijkman [2] have shown that comparative clonal values are not greatly affected by climatic changes, but on the other hand no comparisons appear to have been made of clones on different soils under the same climate. So that as far as we know good yielders will maintain their superiority under all normal planting conditions (" Deniyas " are excluded from this statement as unsuitable for rubber planting).

These maps should be used in conjunction with the individual clonal notes given in the publication I previously mentioned.

To these notes a few more might now be added particularly after the heavy Oidium attack in early 1952.

TJ. 1 This clone is very susceptible to Oidium once in tapping and requires thorough and careful sulphur dusting if it is to maintain its superiority of yield. Is an excellent seed parent.

BD. 5 Also very susceptible to Oidium.

TJ. 16 Is considered to form an excellent seed parent alone or in conjunction with TJ. 1. Nothing however is known about the Oidium susceptibility of the progeny of any of these clones.

PB. 86 Has withstood Oidium best amongst the commercial clones but cannot be considered wholly satisfactory in this respect.

Attention is also drawn to the circular on PB. 86 being issued based on Malayan and Indonesian recommendations. This states that PB 86 can no longer be considered a desirable seed parent and its seed selfed or crossed should not be used. Where plantings of P.B. 86 seed

are in progress, scheduled or have very recently been completed, our advice is to plant at 400 to the acre and thin rigorously including all " yellow leaf " plants in the thinning.

GL. 1 This clone is most susceptible to brown bast and a reduced intensity tapping is desirable. Yields in this clone do not appear to be adversely affected by the lighter tapping and over 1000 lbs/acre can be obtained with *S*/2, *d*/3, 67%.

In conclusion we would like to suggest that planters should interest themselves in the planting of small quantities of the newer experimental material. Such plantings expecially if made in conjunction with a standard such as PB. 86 enable the planter to select the most promising clones for his estate conditions and provide him with an immediate supply of budwood. Such work would render Ceylon largely independent of foreign importations. It may be mentioned that in Indonesia where such a policy has been consistently carried out for 30 years commercial plantings yielding over 1500 lbs/acre are in existence and by selection from these the Research Organisations are in a position to think of yields of 3–4000 lbs/acre in the distant future.

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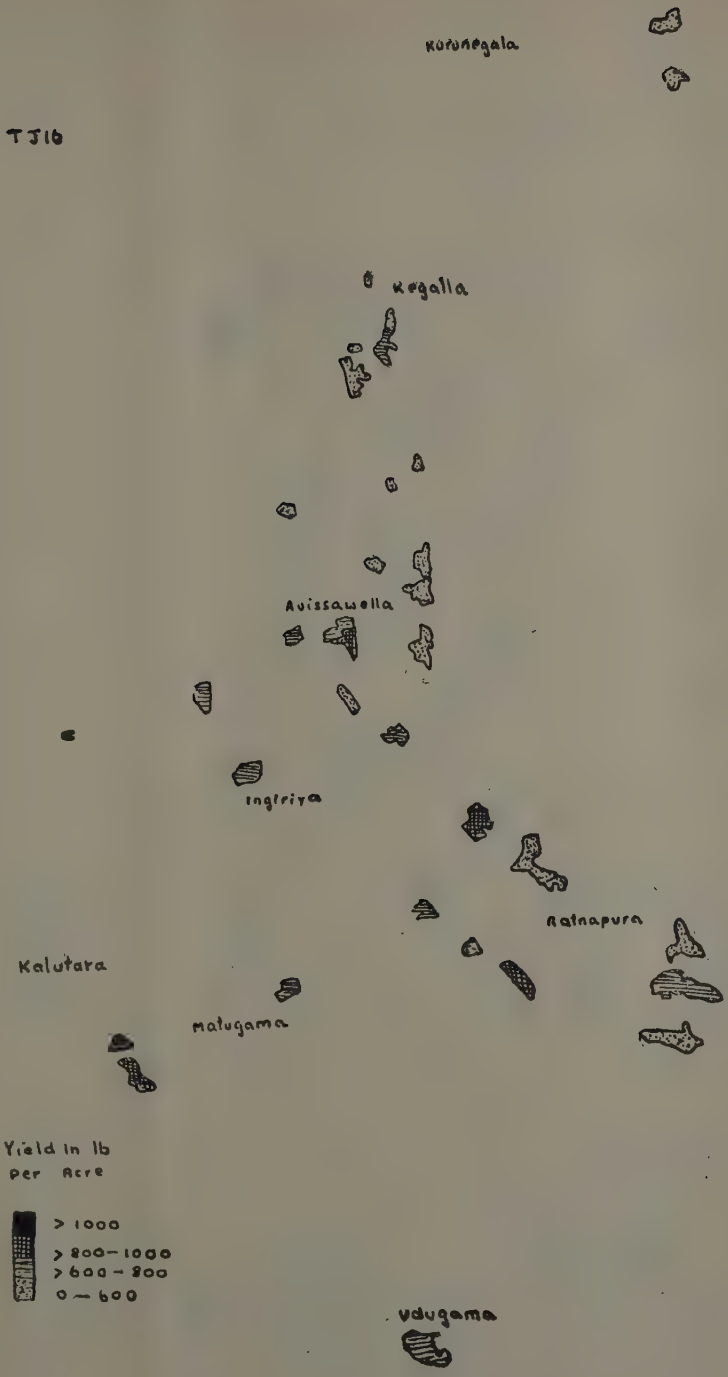
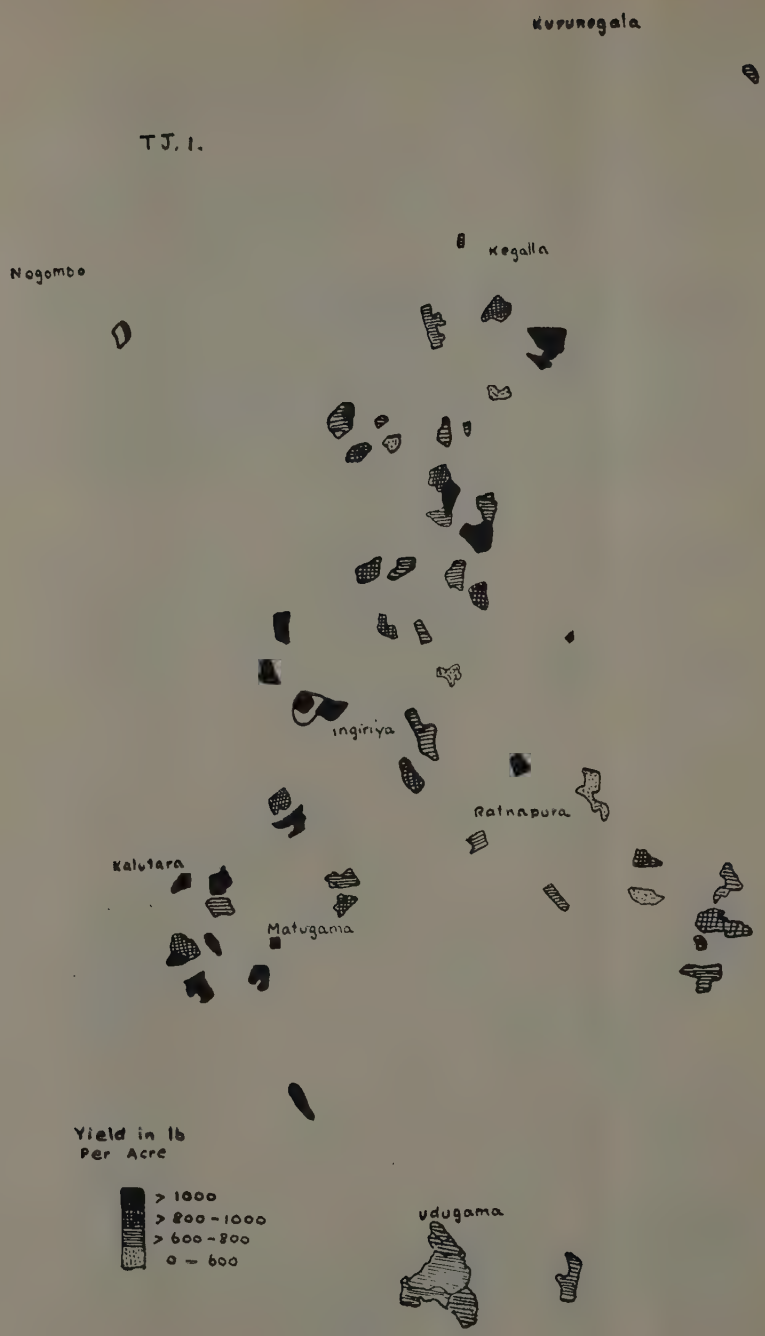
(1) De Silva, R.R.I. of Ceylon Quarterly Circular 3rd & 4th of 1951, Vol. 27, Pages 6–11.

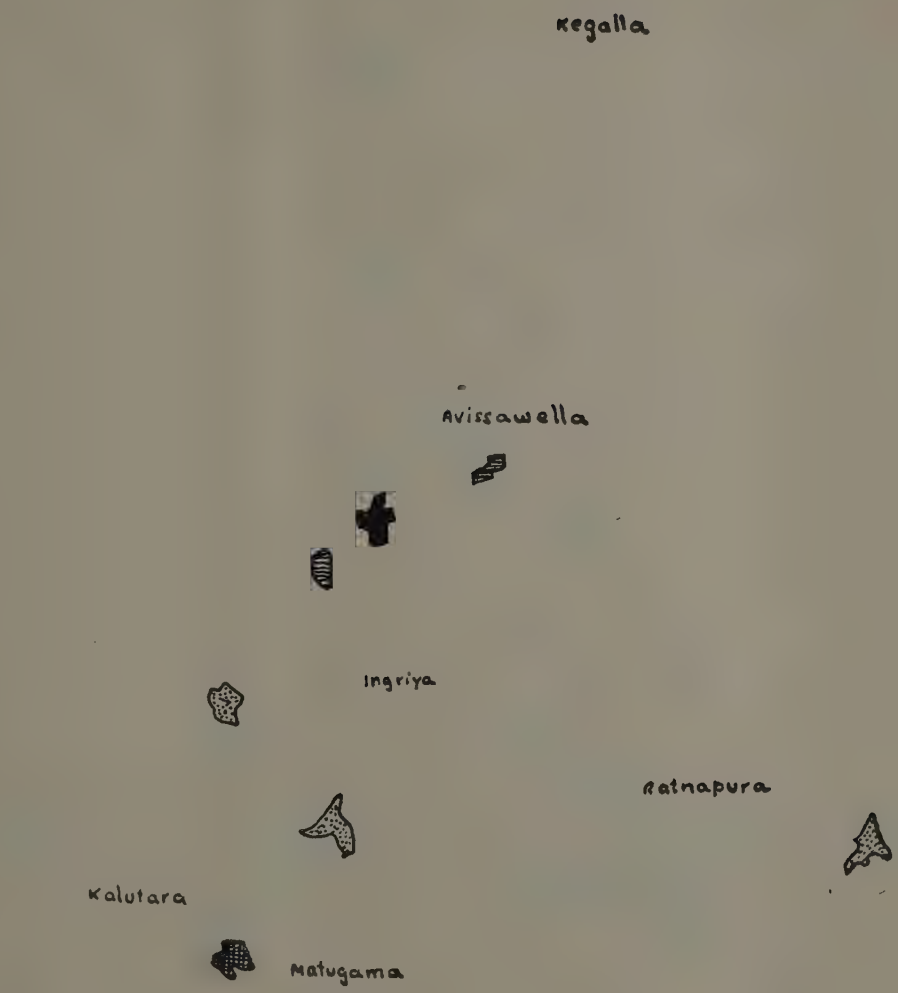
(2) Dijkman, " Hevea " University of Miami Press, Fla, U.S.A., Pages. 55–56.


Kurunegala
Kegalla
Avissawella
Ingiriya
Ratnapura
Kalutara
Matugama
Yield in lb
per Acre
> 1000
> 800 – 1000
> 600 – 800
0 – 600
Udugama

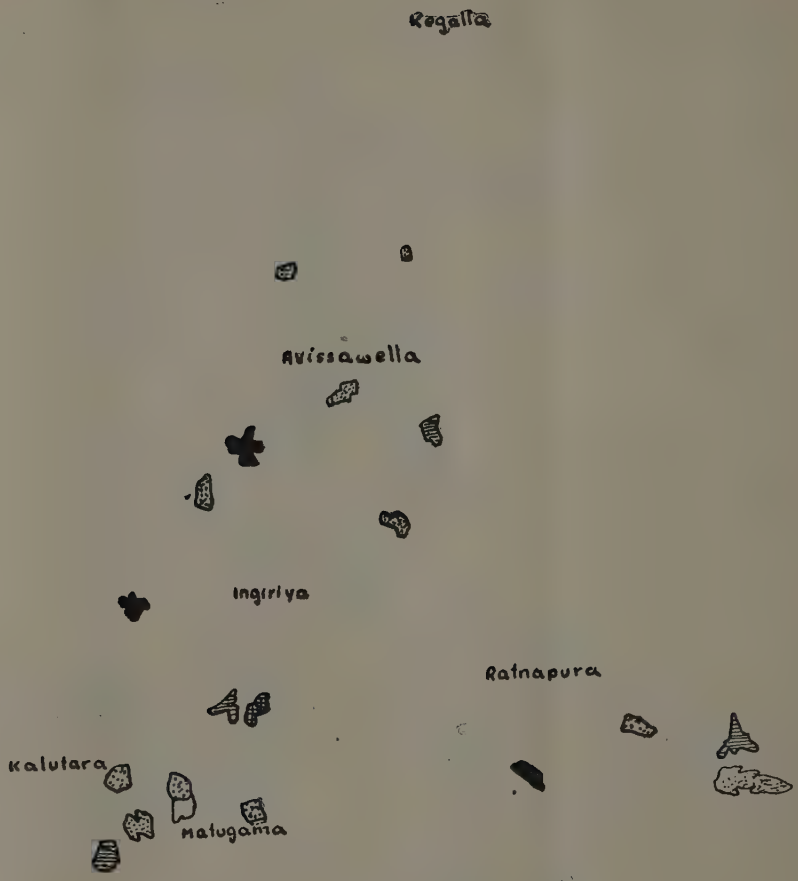
TJ16

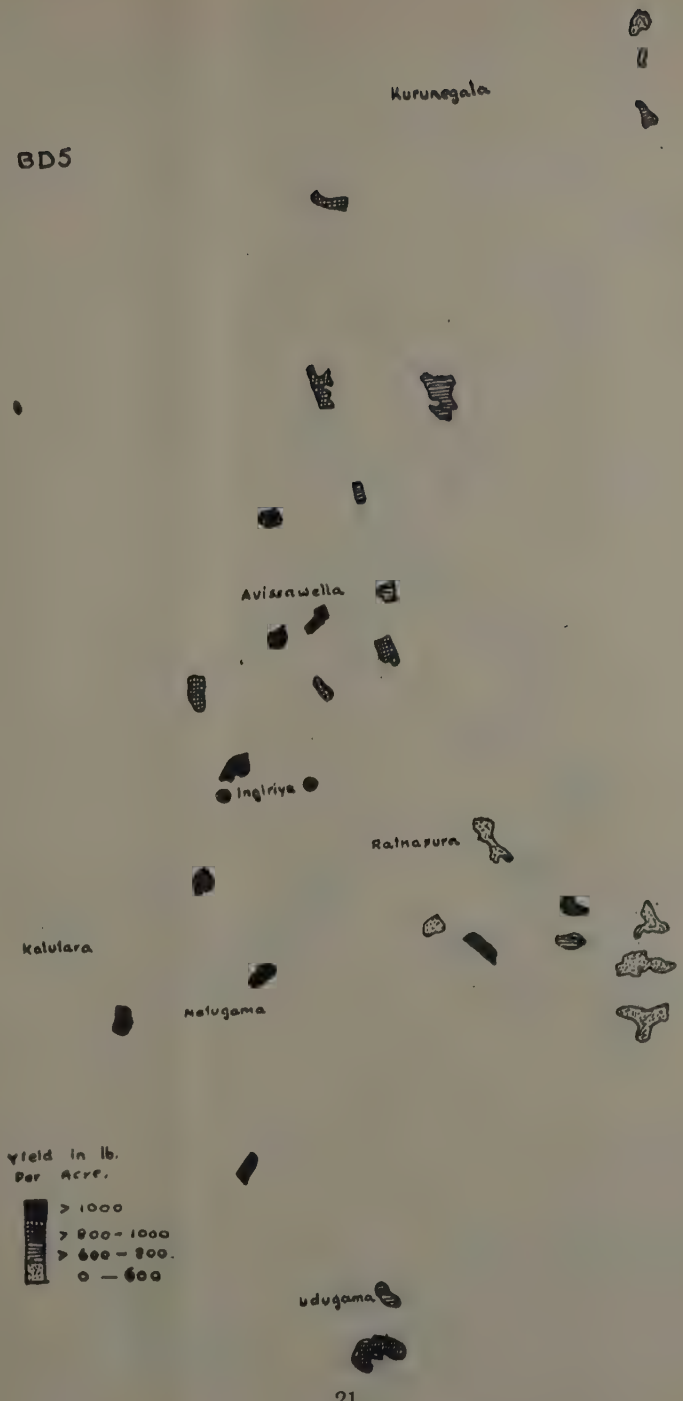

Kurunegala
TJ. 1.
Negombo
Kegalla
Ingiriya
Ratnapura
Kalutara
Matugama
Yield in lb
Per Acre
> 1000
> 800 - 1000
> 600 - 800
0 - 600
Udugama

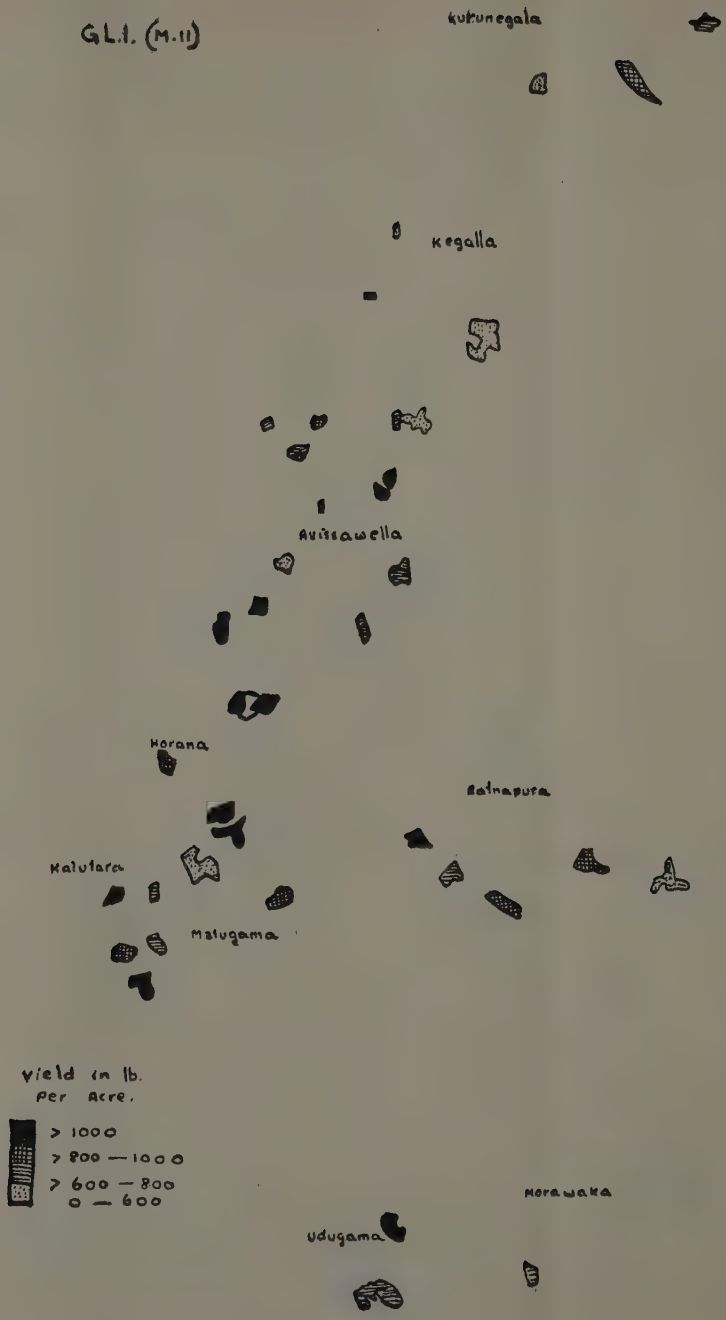
W. G. 6278


Kegalla
Avissawella
Ingriya
Ratnapura
Kalutara
Matugama
Yield in lb
Per Acre
> 1000
> 800 – 1000
> 600 – 800
0 — 600

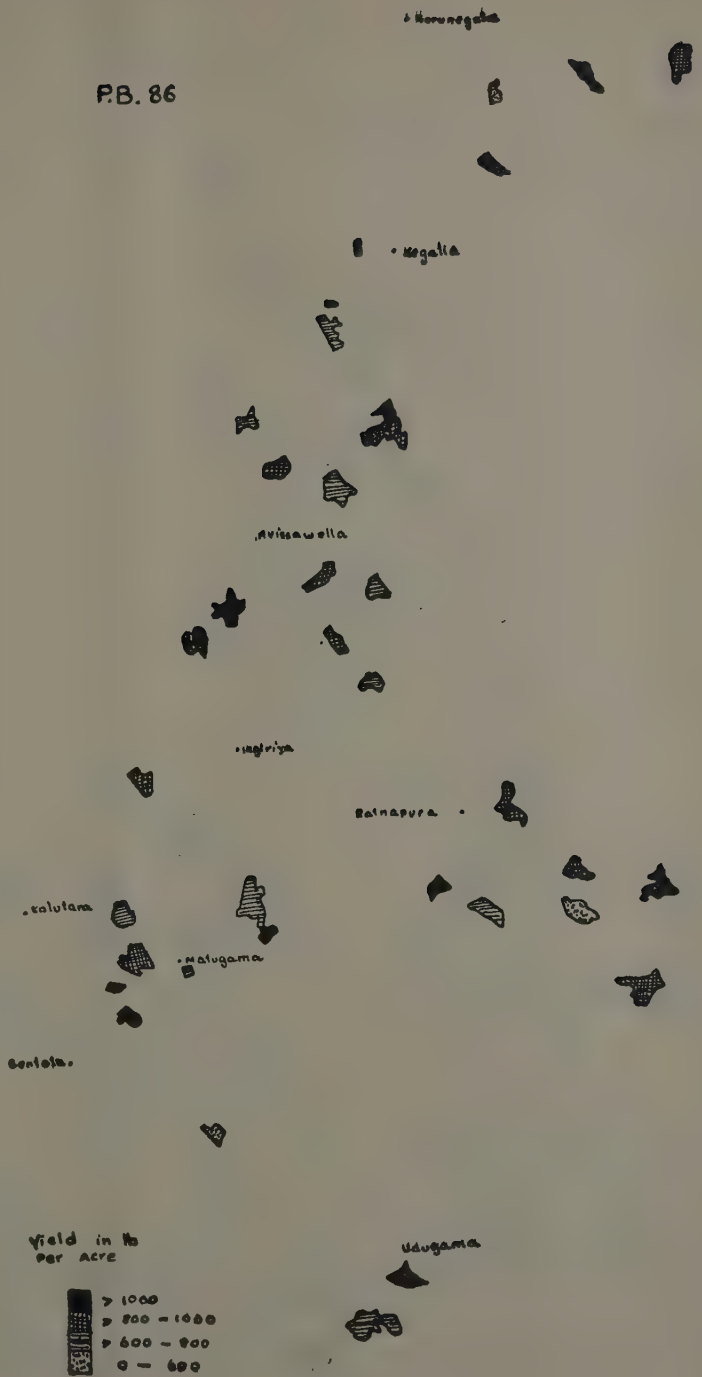
MK 3/2

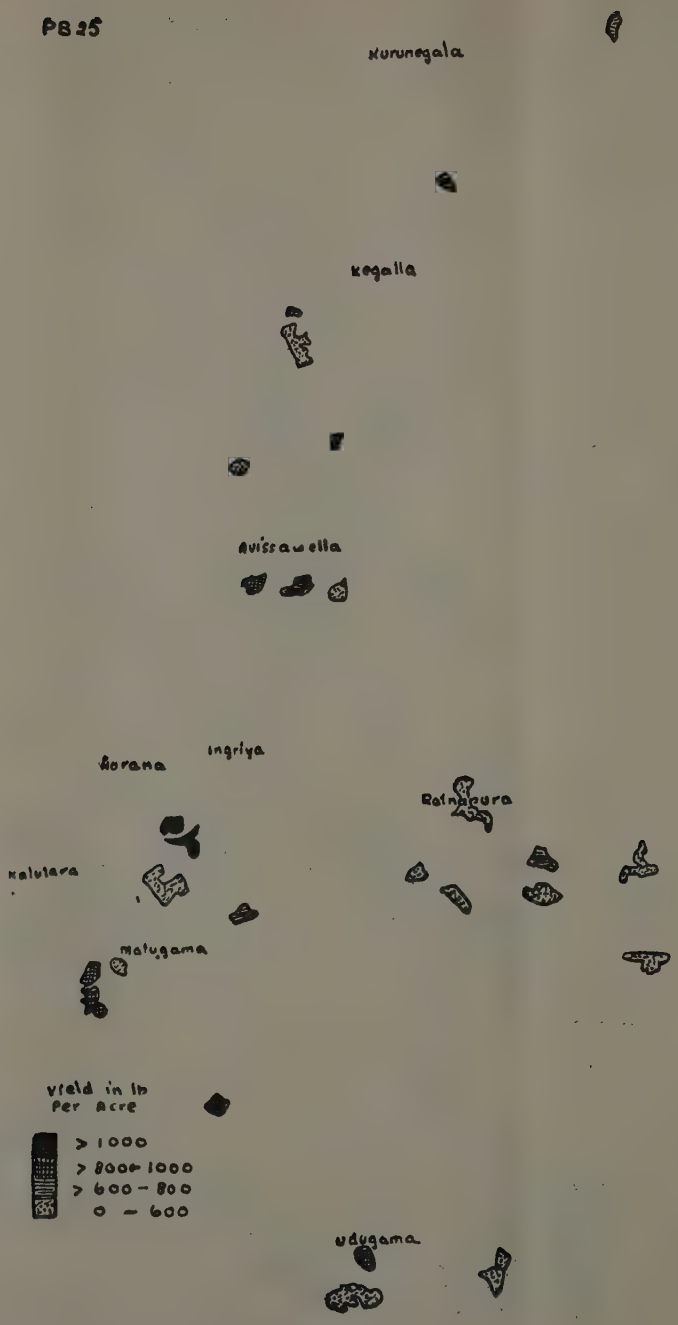

Kegalla
Avissawella
Ingiriya
Ratnapura
Kalutara
Matugama
Yield in lb per Acre
> 1000
> 800 – 1000
> 600 – 800
0 – 600


BD5
Kurunegala
Avissawella
Ingiriya
Ratnapura
Kalutara
Matugama
Udugama
Yield in lb. Per Acre.
> 1000
> 800 - 1000
> 600 - 800.
0 — 600

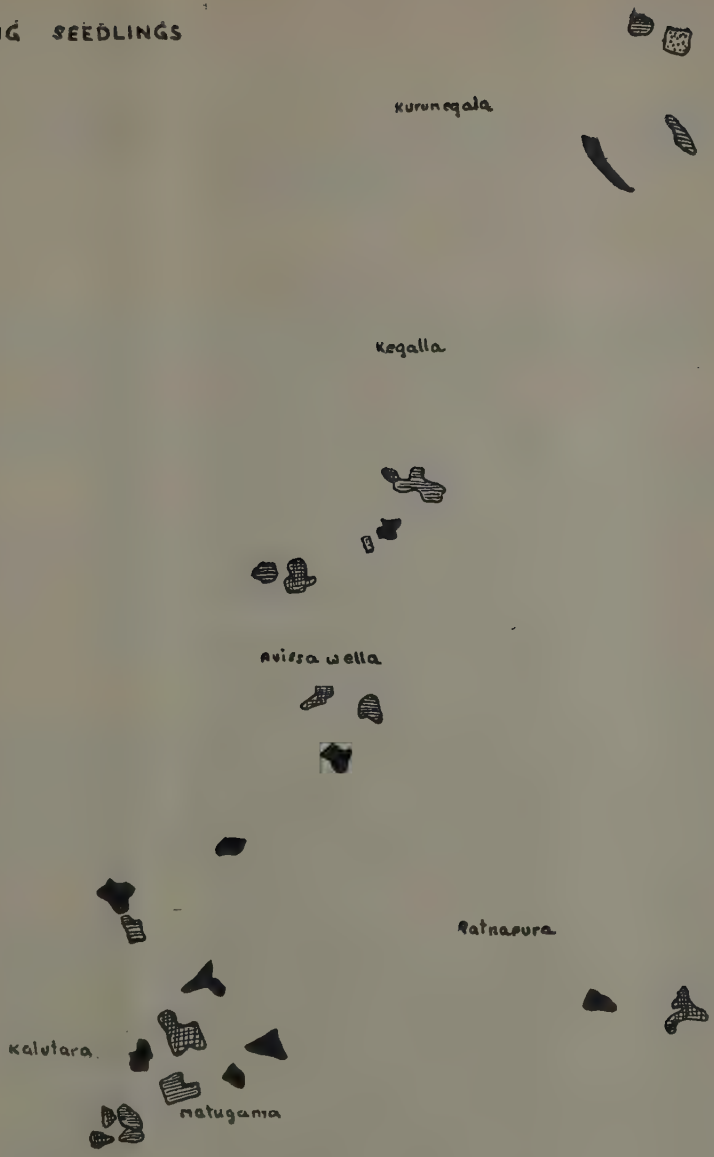

G.L.I. (M.11)
Kurunegala
Kegalla
Avissawella
Horana
Ratnapura
Kalutara
Matugama
Yield in lb.
per Acre.
> 1000
> 800 — 1000
> 600 — 800
0 — 600
Nuwara Eliya
Udugama

P.B. 86


Horanagala
Kegalla
Avissawella
Ratnapura
Kalutara
Matugama
Bentota
Udugama
Yield in lb per Acre
> 1000
> 800 - 1000
> 600 - 800
0 - 600


PB 25
Kurunegala
Kegalla
Ruissawella
Horana
Ingriya
Ratnapura
Kalutara
Matugama
Yield in lb
Per Acre
> 1000
> 800 - 1000
> 600 - 800
0 - 600
Udugama

PBIG SEEDLINGS



Yield in lb per Acre

> 1000
> 800 - 1000
> 600 - 800
0 - 600

TESTING OF TREE KILLING SUBSTANCES ON HEVEA BRASILIENSIS I.

BY

D. H. Constable, M.Sc., D.I.C. Agronomist

THE question of disposal of old rubber trees is of considerable importance on estates where either the lack of roads or the distance from an urban area makes firewood contracts impossible.

The general method in use is to ring bark the tree and apply Sodium Arsenite either as a paste or as a solution into holes drilled in the trunk. The result is a gradual destruction of the tree and with luck no severe damage to the young plantings.

Unfortunately however Sodium Arsenite has joined the list of items in periodic short supply * and we have therefore through the courtesy of Messrs. I. C. I. been afforded the necessary quantities of alternative chemicals for test.

The chemicals utilised were the N Butyl Esters of 2 : 4D and 2 : 4 : 5T separately and in mixture plus a mixture of 2 : 4D and 2 : 4 : 5T and also a sodium chlorate mixture (with an anti-fire additive).

The first experiment utilised the four 2 : 4D and 2 : 4 : 5T mixtures. 96 trees were taken in eight rows of twelve trees. Alternative rows were girdled (ring barked 6–9″) or " frilled " (slashing deeply with an axe). Each row was marked off to receive the chemicals diluted either in oil or water so that two rows received each kind of treatment *i.e.*, girdling or frilling oil or water. In each row the twelve trees were marked off in threes to receive one of the chemicals and to each of the three trees one of the dilutions 1 : 5 1 : 10 or1 : 20 was applied (quantities of 4 oz. – 1 oz. of the original).

After an interval of about one month some half dozen of the trees had been severely affected however there was no indication that any one chemical or treatment was favoured.

A second experiment was therefore started using 24 trees all of which were given eight one-inch diameter borings which were then filled with one or other of the previous mixtures.

Again some unhealthiness was observed but it was quite obvious that the concentrations used or the amounts applied were not sufficient. Owing to the approach of the wintering season the experiment was suspended.

Coincident with the last experiment the sodium chlorate mixture was also utilised by placing the solid in holes bored in the trees. Here some success was being obtained but the early wintering of the trees confused results so this trial has also been postponed till refoliation is complete.

A further report will be issued in due course.

* It is understood that the position is again normal & likely so to remain.

SOME PRINCIPLES FOR MANURING RUBBER IN CEYLON

BY

D. H. Constable

The writing of this article has been prompted by the receipt of letters and queries of three basic types.

These are :—

(*a*) " My rubber has been in tapping for.....years and is only giving me 50–150 lbs. per acre and I feel I must give it some fertiliser now. What should I do ".

(*b*) " My trees are badly defoliated and I would like to apply fertiliser, should I use sulphate of ammonia as that seems to do good to the leaves ".

(*c*) " How should I apply the manures, should I take off all the covers, must I fork etc ? "

The answer to the first is that it would be simpler and probably cheaper to replant and maintain the new plantation in a proper manner particularly as regards fertiliser application. In the Dartonfield experiments where there is undoubtedly " poaching " by trees on the unmanured plot from manured plots all around, and the maintenance and cover crop on the unmanured plot is as good as on the rest of the area, the crop from the unmanured areas were less than 1/3 of those from the fully manured areas in the first two years and just over half in the first four years.

There can be little doubt from the figures and from reports and letters that are received, that full and thorough manuring in the growing stage is most desirable and it seems probable that, given the best of treatment up to tapping age, fertiliser may be economised on thereafter. This latter statement however does not take into account any heavy defoliation due to Oidium when special measures may have to be adopted.

Passing to the second type of letter we will consider the individual fertilisers.

Firstly sulphate of ammonia for many years considered the only fertiliser for mature rubber throughout the East.

The opinion in Java is now as follows.[1] " The application of nitrogen has been shown to have striking effects in two cases only. The fertilising of mature plantings for the purpose of improving the yield has not been recommended."

" For the purpose of improving the health on poor soil phosphates have proved beneficial."

Russell[2] states that, in general, the effect of nitrogen is to make larger, softer, and darker green leaves. In excess he points out that this results in a very thinwalled leaf which is most susceptible to fungous diseases and to drought.

For this reason we can no longer consider large quantities of sulphate of ammonia as the correct answer to health problems in mature rubber and indeed with Oidium at its present stage it is doubtful whether R 400 is desirable and our general policy in diseased areas is to use R 215 or a similar mixture.

As regards phosphates again Indonesia may be quoted : " A fact confirmed in all the rubber centres of the Indonesian Archipelago as well as in Malaya and Ceylon is that phosphates are most necessary for the optimum growth of young rubber ". Constable and Hodnett[3] surveying the long term results of the Dartonfield experiments find that phosphate gives a highly significant result. It is hardly necessary therefore to say any more.

In the case of potassium things are more obscure. The Dartonfield experiments previously quoted[3] do not show a significant effect for potash. On the other hand a mixed fertiliser (phosphate plus N, K, or NK) is consistently better than phosphate alone.

As most of Ceylon rubber soils are extremely acid and have a low clay content (kaolinitic) it may be assumed that their potash content is low. For this reason alone therefore the inclusion of potash on insurance grounds is justified.

At this point it may be of interest to mention that the mixture being used at the moment in R.R.I. experiments is 100 lbs. sulphate of ammonia 100 lbs. Saphos phosphate 50 lbs. muriate of potash (50%) applied at the rate of 2 lbs. per tree per annum. This however is *not*, at present, a recommended mixture.*

Therefore in regard to letter (*b*) we recommend the use of a full mixture such as R 215 applied at the rate 215 lbs. per acre on plantings of 110 per acre or less, or at the rate of 2 lbs. per tree on more dense plantings.

Finally we come to letter (*c*) the answer to which depends mainly on four points : (1) The amount of rain expected after the manuring, (2) The porosity of the soil, (3) The slope of cultivation, (4) The amount and type of covers. The importance of these points arises mainly from the high solubility of both sulphate of ammonia and muriate of potash.

It must be emphasised that there is as far as we know little capacity for the absorption of bases in the soils under consideration. Any considerable rain will therefore tend to carry off most of these nutrients.

If they are incorporated in the soil (by forking etc.) then they have to be washed through the soil which tends to be a slower process and the greater the clay content of the soil the slower it will be and the greater the soil capacity for absorption of the potash and ammonia.

Phosphate on the other hand is not soluble. However if broadcast on the surface of the soil it may be washed off in very heavy rains or if the ground is steep or if the cover crops are thin. There is a further point that the general effect of rock phosphate is much better if it is incorporated thoroughly with the soil[4].

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* Since drafting this paper further evidence has led us to recommend this mixture for trial purposes.

The final question to be answered then is "should the covers be removed"? It is a fact that there will be some competition between the cover crops and the tree for the nutrient supplied. If a leguminous cover is used there should not be severe competition for nitrogen which is one good reason for the use of legumes in preference to grass, mikania etc. However even if there is temporary competition for the phosphate and potash it must be remembered that when the covers die whether naturally or by periodic slashing all those nutrients are returned to the soil and particularly in the case of phosphate frequently in a more available form. In some parts of the world it is a practice to grow a catch crop with a high phosphate extracting power such as lupins, cut them down and mulch them into the soil to provide a better source of phosphate for the proper crop than can be done with ordinary fertiliser applications.

There is one exception to this question of competition and that is with very young plants. Certainly during the first two years of growth the covers must be pulled well back from the area manured (generally within 3 feet round each plant) so that competition is reduced to a minimum, thereafter an increasing amount of competition can be allowed particularly as the covers will by then be providing their quota of nutrient returned to the soil.

One final consideration with regard to manurial applications is the frequency. Mention has been made of the solubility of nitrogen and potash fertilisers. In addition the Ceylon climate is comparatively unpredictable and it is doubtful whether there is any time of the year (in rubber) when you can guarantee not to get rain of the order of inches per hour. Such rain particularly on light sandy soils may carry away a large proportion of your soluble fertilisers We are therefore advocating that trials be made of applying the yearly dose of fertiliser in at least four and if possible six proportionate doses. This greatly reduces the loss of nutrient by adverse weather, ensures a constant supply of nutrient to the tree instead of one overdose and should make better use of the small nutrient absorptive capacity of the soil. Such an investigation is now planned at the R.R.I. with frequencies of application up to one per month.

In conclusion a word about liming which may be of some interest. Most Ceylon rubber soils (excepting possibly Matale area) are fairly, to very, acid and what little is known on the subject suggests that rubber is an acidophilic crop and some attempts at liming have been known to turn out very badly. On the other hand the constant use of sulphate of ammonia may be making the soils so acid that undesirable effects are now arising. This matter is under active investigation but until we know more about this question we would advise against the use of lime as a means of improving rubber soils.

REFERENCES

(1) Dijkman " Hevea " Pages 22–23. University of Miami Press, Florida U.S.A.
(2) Russell Sir E. J. " Soil Conditions & Plant Growth " Pages 31 & 40 8th Edition revised by E. W. Russell.
(3) Constable & Hodnett ; Paper in preparation.
(4) Rice Williams, Chemistry & Industry 1952. No. 3 Pages 61—63

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 111th meeting of the Rubber Research Board held at the Planters' Association Head Quarters, Colombo, at 2-30 p.m. on Tuesday 15th January, 1952.

Present.—Mr. W. A. Paterson (in the Chair), Dr. A. W. R. Joachim (Director of Agriculture), Mr. R. J. Hartley, Mr. F. A. Obeysekera, Senator C. Wijesinghe and Dr. H. E. Young (Director R.R.I.C.).

An apology for absence was received from Mr. J. L. D. Peiris.

(1) Minutes :

(a) **Confirmation.**—Draft minutes of the meeting held on 5th November 1951, which had been circulated to members, were confirmed and signed by the Chairman.

(b) **Matters arising from the minutes :**

(1) **Salaries and terms of service of Staff.**—Revised salary scales and terms of service as recommended by the Director were approved and it was noted that they were in line with those of the Tea Research Institute.

(2) **Reserves and Equipment.**—Lists of additional equipment required for the Chemical and Mycological Departments were tabled and their purchase was approved.

(3) **Representation on London Advisory Committee for Rubber Research (Ceylon & Malaya).**—It was agreed to recommend the renomination of Mr. E. W. Whitelaw for 1952.

(2) **Board.**—The Chairman reported that Major Montague Jayewickrema M.P., had been renominated to represent the House of Representatives for a period of three years with effect from 1st February 1952, or for such period as he remains a member of the House of Representatives, whichever is the shorter.

(3) Reports and Accounts :

(a) Receipts and Payments Account for the 3rd Quarter 1951 was approved.

(b) Supplementary Votes amounting to Rs. 5385.52 were passed.

(4) Staff :

(a) **Director.**—Agreed that Dr. H. E. Young, Director, should take three months leave out of the island about the end of March 1952. Acting arrangements suggested by the Director were approved.

(b) **Mycologist.**—Reported that Mr. J. H. van Emden had arrived in Ceylon and assumed duties as Mycologist and Oidium Research Officer on 8th December 1951.

(c) **Junior Staff.**—Changes in staff since the last meeting were reported.

(d) **Holidays.**—Consequent on the changes in public holidays announced by Government, the holidays to be observed by the Institute were defined.

(5) **Liaison between Far Eastern Units - Conference to be held in 1952.** It was agreed that the Director should attend the Conference of Directors and Scientific Officers of Research Stations in the East to be held in Indonesia towards the middle of 1952.

(6) **London Advisory Committee for Rubber Research (Ceylon & Malaya).**—Minutes of the 54th meetings of the Committee and the Technical Sub-Committee were tabled.

(Sgd.) C. D. De Fonseka,
Secretary-Accountant.

Dartonfield,
Agalawatta.
6th February 1952.

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 112th meeting of the Rubber Research Board held at the Planters' Association Head Quarters, Colombo, at 2-30 p.m. on Monday 10th March 1952.

Present.—Mr. W. A. Paterson, J.P. (in the Chair), Mr. W. P. H. Dias, J.P., Mr. R. J. Hartley, Gate Muhandiram A. D. S. Jayasinghe, Mr. W. Herbert de Silva, Mr. R. H. Wickremesinghe, C.C.S., (Controller of Establishments), Senator C. Wijesinghe and Dr. H. E. Young (Director R.R.I.C.).

Apologies for absence were received from Dr. A. W. R. Joachim (Director of Agriculture) and Major M. Jayawickrema M.P.

(1) **Board :** The Chairman reported that :—

(*a*) Mr. W. P. H. Dias, J.P. and Mr. W. Herbert de Silva had been nominated to represent the Low-Country Products Association for three years from 21st January, 1952 in place of Messrs. J. L. D. Peiris and Francis Amarasuriya.

(*b*) Gate Muhandiram Arthur D. S. Jayasinghe had been nominated by the Hon'ble the Minister of Agriculture and Lands to represent the small-holders for three years from 1st February, 1952 in place of Mr. F. A. Obeysekera.

The new members were welcomed to the Board. In proposing a vote of thanks to the retiring members the Chairman made special reference to the valuable services rendered by Mr. Obeysekera who had been a member since July 1931. The vote of thanks was seconded by Mr. Hartley and carried unanimously.

Mr. Hartley mentioned that he would be away from the Island for six months from 14th April 1952 and it was agreed that he be given leave of absence for this period.

(2) Minutes :

(a) **Confirmation.**—Draft minutes of the meeting held on 15th January 1952, which had been circulated to members, were confirmed and signed by the Chairman.

(b) **Matters arising from the minutes :**

(1) **New salary scales.**—Details of the conversion of salaries to the new scales were approved.

(2) **Reserves & Equipment.**—Estimates of equipment and other capital requirements of the Estate Dept. amounting to a total cost of Rs.290,000 were considered and approved.

(3) **Contribution to the British Rubber Producers' Research Association.**—Agreed that an annual contribution be offered to Government from the Institute's funds for making up whatever sum the Government may decide to contribute.

(4) **Conference of Scientific Officers in the East.**—Agreed that the Director and the Chemist should attend the Conference to be held at Bogor, Indonesia, in July 1952.

(3) Reports and Accounts :

(a) **Annual Report for 1951.**—The Chairman congratulated the Director on the full and complete activities of the Institute set out in the report and on its prompt preparation. The report was approved and it was agreed that it should be printed together with the Balance Sheet and Auditor's Report for 1950.

(b) **Visiting Agent's Report** — was approved.

(c) **Visiting Engineer's Report** — was approved.

(d) **Statement of Receipts & Payments for the 4th Quarter 1951** — was approved.

(e) **Estate Accounts July to November 1951** — were tabled.

(f) **Supplementary Votes** — A supplementary vote was passed for the construction of a greenhouse at Dartonfield for the use of the Mycological Department.

In this connection a member mentioned a discussion at the last meeting of the Kalutara District Planters' Association regarding the appointment of an Oidium Research Officer. It was agreed that the Chairman K.P.A. be informed that there is at present a full time Oidium Research Officer and Mycologist on the Institute's Staff.

(g) **Tenders for labourers' cottages** — Tenders for the construction of six double labourers' cottages at Hedigalla were considered and the lowest tender of Rs. 6000.15 per cottage was accepted.

(4) Staff :

(a) **Changes in staff** — Changes in staff since the last meeting were reported.

(b) **Retiring age** — The retiring age for the Institute's staff was fixed as follows :—

Optional at age 55
Compulsory „ 60

(c) **Opening of Staff Club House** — The Chairman announced that the Staff Club House at Dartonfield would be formally opened at 4–30 p.m. on Sunday 23rd March and invited members to be present.

(5) **Rubber Co-operative Societies.**—A letter from the Permanent Secretary to the Ministry of Food and Co-operative Undertakings stating that action would be taken to expedite the registration of certain rubber Co-operative Societies was tabled.

(6) **Publications.**—The following publications were tabled :—

Advisory Circular No. 31 — Root disease in replanted areas.
„ „ 32 — Crown budding for Oidium resistance.

(7) **Sulphur for dusting purposes.**—Action taken to obtain adequate supplies of sulphur for the next dusting season was reported and it was noted that two local firms were taking an interest in setting up plant to grind and prepare crude sulphur to the required specifications.

(8) **Press Report.**—An incorrect and unauthorised press report regarding the composition of the Board was brought to the notice of the Board and it was noted that the attention of the papers concerned had been drawn to the inaccuracies.

The meeting terminated at 4–27 p.m. with a vote of thanks to the Chair.

(Sgd.) C. D. De Fonseka,
Secretary-Accountant.

Dartonfield,
Agalawatta.
3rd April 1952.

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 113th meeting of the Rubber Research Board held at the Planters' Association Head Quarters, Colombo, at 2–30 p.m. on Monday 19th May 1952.

Present.—Mr. W. A. Paterson, J.P., (in the Chair), Mr. W. P. H. Dias J.P., Dr. A. W. R. Joachim (Director of Agriculture), Gate Muhandiram A. D. S. Jayasinghe, Mr. R. H. Wickremasinghe, C.C.S., (Controller of Finance & Supply) and Dr. E. J. Risdon (Acting Director R.R.I.C.).

An apology for absence was received from Mr. F. A. Ruck.

(1) **Board :** The Chairman reported that :—

(*a*) Mr. F. A. Ruck of Messrs Carson Cumberbatch & Co., had been nominated to represent the Planters' Association of Ceylon during the absence of Mr. R. J. Hartley on furlough, as from 14th April 1952.

(*b*) The terms of office of Messrs. Montague Jayawickreme and C. Wijesinghe had been extended by the Minister of Agriculture & Lands until the election of members to the new Parliament takes place.

A letter of thanks from Mr. F. Amarasuriya in respect of the vote of thanks passed for his services as a member was read.

(2) Minutes :

(**a**) **Confirmation.**—Draft minutes of the meeting held on 10th March 1952, which had been circulated to members, were confirmed and signed by the Chairman.

(**b**) **Matters arising from the minutes :**

(1) Experimental Committee and Smallholdings Committee:—

The following members were nominated to fill existing vacancies in the membership of the Committee :—

Messrs. W. P. H. Dias, R. J. Hartley and Gate Muhandiram A. D. S. Jayasinghe.

The Smallholdings Committee was revived and the following members were nominated thereto :—

Mr. W. P. H. Dias, Gate Muhandiram A. D. S. Jayasinghe and the Director.

(2) **Visiting Engineer's Report.**—As recommended by the Visiting Engineer, the retention of a D.C. electricity supply was decided on and the purchase of a 160 KW generating set was approved.

(3) Reports and Accounts :

(*a*) Estate Accounts for December 1951 were tabled.

(*b*) Supplementary Votes amounting to Rs. 43,550/- were passed.

(4) Staff :

(**a**) **Director.**—Reported that Dr. H. E. Young, Director, had gone on three month's leave on 27th March and that Dr. E. J. Risdon, Chemist was acting as Director with effect from that date.

(**b**) **Assistant Staff.**—Changes in staff since the last meeting were reported.

(5) Technical matters :

R.R.I.M. Patent Policy.—The terms on which new processes patented by the Rubber Research Institute of Malaya may be used by rubber producers in Ceylon and certain other countries were noted.

(6) **London Advisory Committee.**—Minutes of the 55th meetings of the Committee and the Technical Sub-Committee were tabled.

(7) **Publications.**—The following publications were tabled :—

(*a*) Combined 1st & 2nd Quarterly Circulars for 1951.
(*b*) Advisory Circular No. 33.

(8) **Any other Business :**

(a) **Conference of Scientific Officers at Bogor, Indonesia.**—Noted that Dr. H. E. Young, Director, and Dr. E. J. Risdon, Chemist, would attend the conference of Scientific Officers of Research Institutes to be held at Bogor, Indonesia, in mid July.

The meeting then terminated with a vote of thanks to the Chair.

(Sgd.) C. D. De Fonseka,
Secretary-Accountant.

Dartonfield,
Agalawatta,
11th June 1952.

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RUBBER RESEARCH INSTITUTE OF CEYLON

STAFF

Director	..	H. E. Young, D.Sc., Agr. (Queensland)
Chemistry Department		
Chemist	..	E. J. Risdon, M.A., D.Phil., (Oxon) A.R.I.C.
Research Assistant	..	Vacant
Laboratory Assistants	..	D. S. Muthukuda, M. T. Veera-bangsa & G. G. Gnana-segaram
Botany Department		
Botanist	..	C. A. de Silva, B.Sc. (Lond) C.D.A. (Wye)
Research Assistant	..	Vacant
Computer	..	W. G. V. Fernando
Laboratory Assistant	..	C. Amaracone
Mycology Department		
Mycologist & Oidium Research Officer	..	Ir. J. H. Van Emden (Wageningen)
Actg. Asst. Mycologist	..	D. M. Fernando, B.Sc. (Ceylon)
Laboratory Assistant	..	M. D. David
Agronomy Department		
Agronomist	..	D. H. Constable, M.Sc., D.I.C., A.R.C.S.
Research Assistant	..	A. J. Jeevaratnam, B.Sc. (Agr.) (Ceylon).
Laboratory Assistant	..	T. C. Z. Jayman
Estate Department		
Superintendent	..	G. W. D. Barnet
Conductors-in-Charge	..	H. M. Buultjens, L. P. de Mel & D. C. Kannangara
Experimental Conductors (5)		
Clerks (3)		
Rubber—Maker, Storekeeper, Dispenser, Senior Artisan and Electrician		
Smallholdings Department		
Smallholdings Propaganda Officer	..	W. I. Pieris, B. A. Hortic (C'tab)
Assistant Propaganda Officers	..	N. W. Palihawadana, K.Wilson de Silva, H. H. Peiris and P. W. W. de Silva, B.Sc. Agr. (Ceylon) (Probationery)
District Field Officers	..	D. R. Ranwala, P. S. G. Cooray, D. E. A. Abeywickrema and B. D. Pedrick
Rubber Instructors (36)		
Clerks (4)		
Administration		
Secretary-Accountant	..	C. D. de Fonseka, A.C.C.A., A.C.C.S.
Chief Clerk	..	B. Tillekeratne
Clerks (7) and Clerk-Librarian		

NOTE : The Laboratories and Head Quarters Offices of the Institute are situated at Dartonfield Estate, Agalawatta. Telephone No. 26 Agalawatta. Telegraphic Address 'Rubrs' Agalawatta. There are two Experimental Stations, one at Nivitigalakele, Matugama and the other at Hedigalla, Latpandura. The office of the Smallholdings Dept. is at Eastern Bank Buildings, Fort, P.O. Box 901, Colombo. Telephone No. 2462, Colombo.

All enquiries and other communications should be addressed to the Director Rubber Research Institute of Ceylon, Agalawatta.